DOCUMENT RESUME

ED 430 818 SE 062 621

TITLE Navigating the Map: Mathematics. High School. Released Items, Scoring Guides, Anchor Papers.

INSTITUTION Missouri State Dept. of Elementary and Secondary Education, Jefferson City.

PUB DATE 1998-00-00

NOTE 96p.; For the "Elementary" and "Intermediate" guides, see SE 062 619-620.

PUB TYPE Guides - Classroom - Teacher (052)

EDRS PRICE EDRS Price MF01 Plus Postage. PC Not Available from EDRS.

DESCRIPTORS *Educational Assessment; Elementary School Mathematics; High Schools; *Mathematics Achievement; Mathematics Education; *Mathematics Tests; *Scoring; *State Programs; *Test Items

IDENTIFIERS *Missouri

ABSTRACT

This booklet provides information and examples from the Mathematics Missouri Assessment Program (MAP) for high school levels, given in the spring of 1998. These materials include the released items, anchor papers, and scoring guides. The MAP items consist of constructed responses and performance tasks from the state assessment. Anchor papers were selected from student work and represent the different levels of achievement as established through the scoring guides. There are several errors in general that seem to be prevalent among students. Students should be instructed in ways that will help them avoid such errors. Six strategies that should be emphasized to students at all levels to avoid those errors are presented. (ASK)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 430 818

SCOPE OF INTEREST NOTICE

The ERIC Facility has assigned this document for processing to: SE

In our judgment, this document is also of interest to the Clearinghouses noted to the right. Indexing should reflect their special points of view. TM

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY

R.E. Bourdeau

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2A

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Navigating the MAP: Mathematics

HIGH SCHOOL

- Released Items
- Scoring Guides
- Anchor Papers

Spring 1998

Missouri Department of Elementary and Secondary Education

BEST COPY AVAILABLE

Introduction

This booklet provides information and examples from the Mathematic's Missouri Assessment Program (MAP), given in the spring of 1998. These materials include the released items, anchor papers and scoring guides. The MAP items consist of constructed responses and performance tasks from the state assessment. No *TerraNova* items (multiple choice format) are being released.

Anchor papers were selected from student work and represent the different levels of achievement as established through the scoring guides. Student work is evaluated against these anchors to determine the appropriate student score. Annotations (in boxes) or on corresponding pages are shown with each anchor to explain the reason for assigning the indicted score.

There are several errors that in general seem to be prevalent among students. Students should be instructed in ways that will help them avoid such errors. The following strategies should be emphasized to students at all levels:

1 ***Show work***

If the prompt asks for work to be shown then the student must include this work in the response. The ability to demonstrate the process is a major focus for constructed responses and performance events.

2 ***Communicate ideas clearly***

Student work must be organized and clearly communicate the ideas of problem solving. Individuals scoring these items are instructed not to second guess what the student has proposed as a response. Work should indicate logical and sequential steps that clearly demonstrate student understanding.

3 ***Determine reasonableness of solution***

In many questions, solutions were given that were quite unreasonable. Students should be encouraged to reflect upon their response in relation to the information provided and to what the prompt is requesting. In cases where basic computations were involved, good estimation skills would be most beneficial.

4 ***Check all conditions***

Some items(especially performance tasks) require multiple conditions to be met. Students may find an appropriate solution but may not demonstrate that this satisfies all of the conditions indicated in the problem. Students must indicate that conditions are met and that the proposed solution is appropriate.

5 ***Choosing correct operations and formulas***

Some students solve word problems by simply counting the number of numbers that may appear in the problem or use inappropriate formulas based upon word expressions given in the problems. For example, students might select to use addition because several numbers are listed with out little recognition of the problem content. Students must read for understanding and have a repertoire of problem solving strategies.

6 ***Inappropriate use of tools***

Students had problems using some of the manipulatives provided. Students at grade 4 could not associate the correct geometric names with individual pattern blocks. In higher grades, many students could not appropriately read a protractor or make correct substitutions in formulas.

Released Items

This picture means that you will use your ruler.

This picture means that you will use your coins.

This picture means that you will use your pattern blocks.

Session 1

BEST COPY AVAILABLE

68931-98

AMUSEMENT PARK

Directions

Numbers 1 through 4 are about going to the amusement park with your friends. Show all of your work and write your answers directly in this booklet.

1

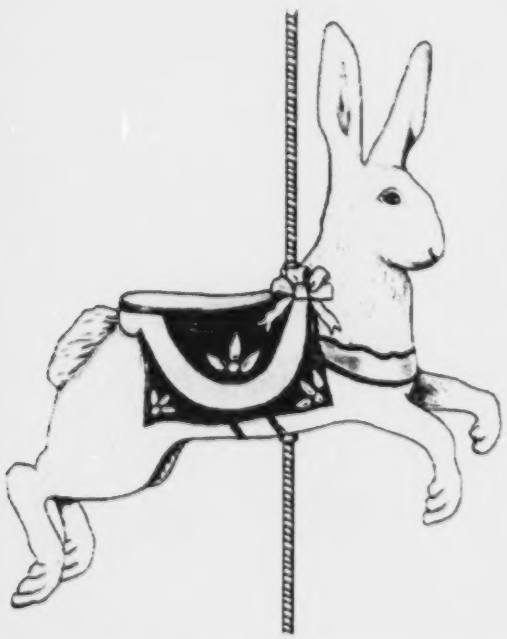
The outer ring of horses on the merry-go-round is 30 feet from the center. The inner ring is 25 feet from the center. If you are on the outer ring and your friend is on the inner ring, what is the difference in distance traveled by you and your friend after the merry-go-round completes 15 revolutions? Provide the work that shows how you arrived at your answer.

2 You are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDE TIMES

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on the average ride time for the first 4 rides, what is the ***maximum*** number of rides you can go on during the hours you are at the park? Provide the work that shows how you arrived at your answer.



BEST COPY AVAILABLE

S

Go On

3 On Fun Fridays, prizes and discounts are given away to the first 300 people who enter the amusement park. Every 6th person who enters the park gets a coupon for a free ride on the Twister, and every 14th person receives a 10% discount on any food they buy that day. Of the first 300 people who enter the park on Fun Friday, how many will receive both a free ride coupon ***and*** a 10% discount on food? Provide the work that shows how you arrived at your answer.

4 A parking lot near the amusement park charges $2.00 for the first hour and $0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee (F) based on the number of hours (h) you spend at the amusement park.

Using your equation, how much will you pay the parking attendant for 6 hours of parking time? Provide the work that shows how you arrived at your answer.

Go On

Directions

Numbers 5 through 7 are about skateboarding. Show all of your work and write your answers directly in this booklet.

5 Ryan, Tracy, Suzanne, and Chris were discussing the order in which they should use a skateboard ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

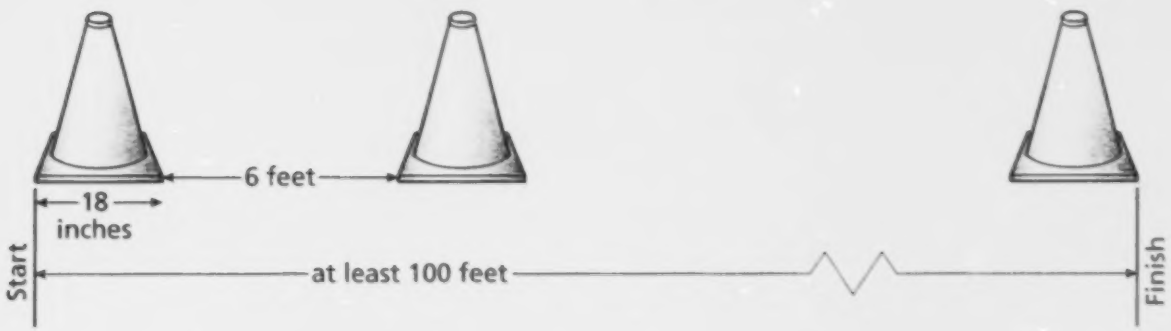
6 Over the last 6 weeks Ryan has been trying to increase the number of times he can skateboard from the top of one side of the ramp to the top of the other and back without stopping. The table shows his results for the first 6 weeks.

RYAN'S PRACTICE RESULTS

Week	Runs
1	1
2	3
3	7
4	13
5	21
6	31
7	
8	

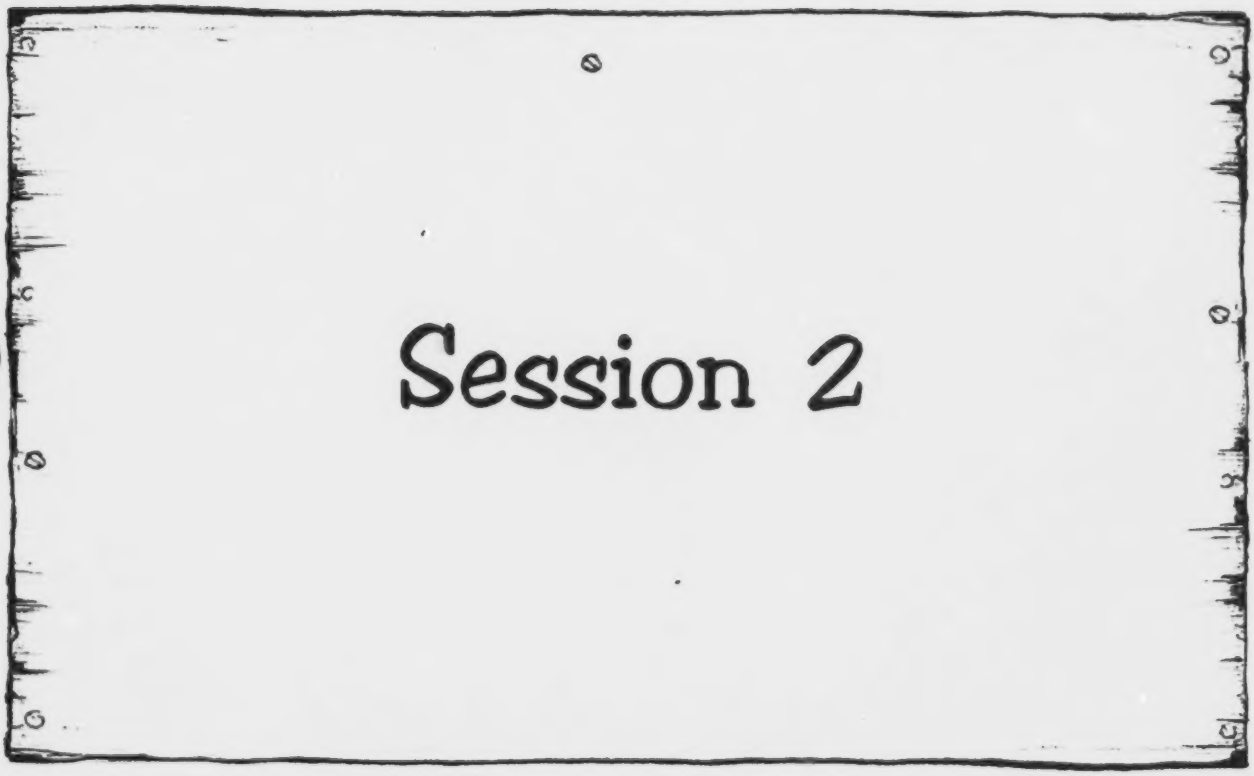
If Ryan continues to improve in Weeks 7 and 8 following the same pattern shown in the table, how many successful runs can he expect each week? Provide the work that shows how you arrived at your answers.

7 Loni and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.



If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the ***minimum*** number of cones required to make a course that is ***at least*** 100 feet long? Provide the work that shows how you arrived at your answer.

Exactly how many feet long will the course be?


Session 2

Telephone Rates

Directions

Show all of your work and write your answers directly in this booklet.

1 John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

John contacted several telephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

TELEPHONE COMPANY RATES

	National Telex		Dial-Direct, Inc.	
	First minute	**Each additional minute**	**First minute**	**Each additional minute**
Daytime	$0.46	$0.18	$0.30	$0.20
Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	$0.35	$0.12	30% off daytime	30% off daytime

BEST COPY AVAILABLE

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

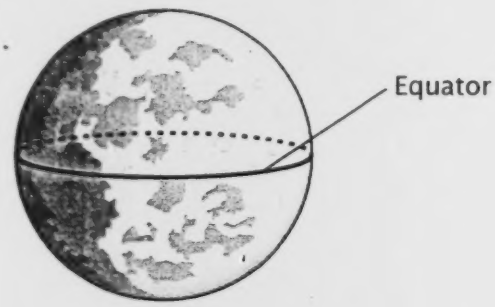
Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., ***and*** when each company would charge the same amount.

Planets

Directions

Numbers 8 through 10 are about the planets of the solar system.
Show all of your work and write your answers directly in this booklet.

8 The equator of a planet is defined as its circumference drawn perpendicular to its axis of rotation.



If the radius of Mars is 2100 miles, what is the length of its equator? Provide the work that shows how you arrived at your answer.

9

About 70% of Earth's surface is covered with water. If the radius of Earth is approximately 4000 miles, approximately how many square miles of its surface are landmasses? Provide the work that shows how you arrived at your answer.

(Surface Area = $4\pi r^2$)

10

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

BEST COPY AVAILABLE

17

STOP

Scoring Guides

18

MISSOURI ASSESSMENT PROGRAM
MATHEMATICS SPRING 1998
SCORING GUIDE
GRADE 10

1. Students should not be penalized for omitting the following:

   - degree symbols
   - dollar signs ($) or cent signs (¢)
   - zeros for place holders; for example, either 0.75 or .750 could be used
   - labels for word problems; for example, "miles"

2. Students should not be penalized for:

   - spelling or grammar errors
   - using abbreviations; for example, ft or feet could be used
   - adding extra answer(s) as long as the answer(s) are correct and indicated as answer(s); however, if the extra answer(s) are incorrect, one point will be deducted.

3. Students should be given credit for:

   - answers not written on answer line; for example, answer could be given in work space or in explanation

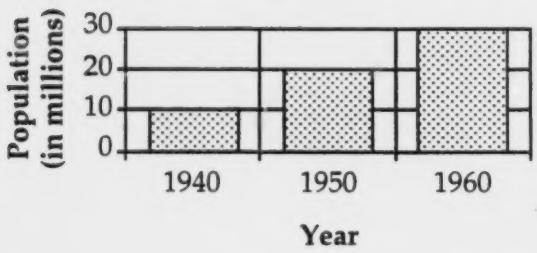
4. Graphs

   - The order in which the data in bar and circle graphs are graphed is NOT important.
   - Line graphs are acceptable with or without lines connecting the points.
   - Any width of a bar in a bar graph is acceptable.
   - Students should be given full credit for graphing extra data point(s) as long as the point(s) are reasonable.
   - Students should not be penalized for compressing the interval between 0 and the first increment as long as the other intervals are consistent.
   - Bar graphs can be horizontal or vertical; however, bars must originate at the axis representing the independent variable. (See attached.)

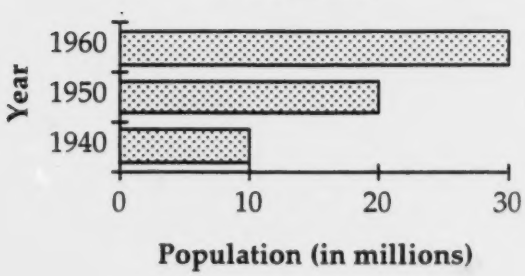
Condition Codes:

A. No response/refusal
B. Insufficient work to score
C. Off task
D. Illegible
E. Predominantly in another language

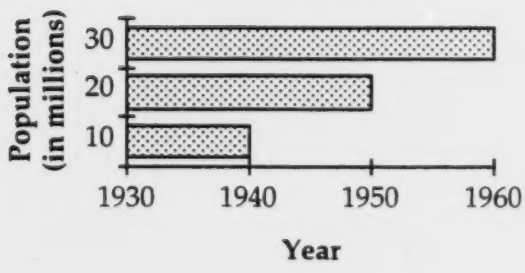
CORRECT



CORRECT



INCORRECT



Session: 1
Item: 1
Page: 2
Content Standard(s): 2 Geometric/Spatial Sense and Measurement
Process Standard(s): 3.7

Exemplary Response:

- 471 (feet) or 150π (feet) or 465 (feet) when values are rounded

AND

- $3.14(2 \times 30) \times 15 = 2826$
  $3.14(2 \times 25) \times 15 = 2355$
  $2826 - 2355$

  OR

  Other valid process

Score Points:

2 points	Exemplary Response
1 point	Correct process; error in computation
	OR
	Correct answer
0 points	Other

Session: 1
Item: 2
Page: 3
Content Standard(s): 3 Data Analysis, Probability, and Statistics
Process Standard(s): 3.7

Exemplary Response:

- 17 (maximum rides)

AND

- Finds the total time ($5\frac{1}{2}$ hours or 330 minutes)
  Finds the average time per ride (19 minutes)
  Finds the number of rides

  OR

  Other valid process

Score Points:

2 points	Exemplary Response
1 point	Correct process; error in computation
	OR
	Correct answer
0 points	Other

Scoring Comments:

If value of 19 is used correctly (330 ÷ 19) but actual average process is not shown, give credit for process.
Guess and check is acceptable for other valid process.
If half hour for lunch is not subtracted, but process is otherwise complete, student earns a process point.

Ex: $\frac{360 \text{ min.}}{19 \text{ min.}} \approx 18$ rides

22

Session: 1
Item: 3
Page: 4
Content Standard(s): 5 Mathematical Systems and Number Theory
Process Standard(s): 3.1

Exemplary Response:

- 7 (people)

AND

- $6 = 2 \times 3$
  $14 = 2 \times 7$
  $2 \times 3 \times 7 = 42$ (Least Common Multiple)
  $300 \div 42 = 7.14$ or 7

  OR

  6: 0, 6, 12, 18, 24, 30, 36, 42, 48
  14: 0, 14, 28, 42, 56
  42nd, 84th, 126th, 168th, 210th, 252nd, 294th

  OR

  Other valid process

Score Points:

2 points	Exemplary Response
1 point	Correct process; error in computation
	OR
	Correct answer
0 points	Other

Scoring Comments:

Must show a process for finding L.C.M.

Session: 1
Item: 4
Page: 4
Content Standard(s): 4 Patterns and Relationships
Process Standard(s): 1.6

Exemplary Response:

- $F = 2 + 0.5[2(h - 1)]$; (where h = number of hours)

  OR

  $F = 2 + 1(h - 1)$; (where h = number of hours)

  OR

  $F = h + 1$ (where h = number of hours)

  OR

  Other valid equation

AND

- 7.50 (dollars)

AND

- $F = 2 + 0.5[2(6.5 - 1)]$
  $F = 2 + 5.5$

  OR

  Process using other valid equation

Score Points:

3 points	Exemplary Response (three components)
2 points	Two components
	OR
	Appropriate solution and process using incorrect equation
1 point	One component
0 points	Other

24

Session: 1
Item: 5
Page: 5
Content Standard(s): 6 Discrete Mathematics
Process Standard(s): 3.4

Exemplary Response:

- 24 (combinations)

AND

- $4 \times 3 \times 2 \times 1$ (= 4!)

OR

R, T, S, C	T, R, S, C	S, C, R, T	C, R, S, T
R, T, C, S	T, R, C, S	S, C, T, R	C, R, T, S
R, C, S, T	T, C, R, S	S, R, T, C	C, S, R, T
R, C, T, S	T, C, S, R	S, R, C, T	C, S, T, R
R, S, T, C	T, S, C, R	S, T, R, C	C, T, R, S
R, S, C, T	T, S, R, C	S, T, C, R	C, T, S, R

OR

Tree diagram

OR

Other valid method of finding all of the combinations

Score Points:

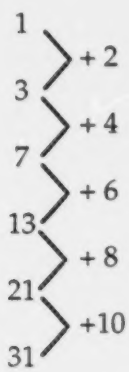
2 points	Exemplary Response
1 point	Correct process; error in computation
	OR
	Correct answer
0 points	Other

Session: 1
Item: 6
Page: 6
Content Standard(s): 4 Patterns and Relationships
Process Standard(s): 1.6

Exemplary Response:

- 43 (runs for week 7)
  57 (runs for week 8)

AND

- 

  $31 + 12 = 43$
  $43 + 14 = 57$

  OR

  Other valid process

  Ex: $w^2 - (w - 1) =$ runs
  $7^2 - 6 = 43$ and $8^2 - 7 = 57$

Score Points:

2 points	Exemplary Response (two components)
1 point	One component
0 points	Other

26

Session: 1
Item: 7
Page: 7
Content Standard(s): 5 Mathematical Systems and Number Theory
Process Standard(s): 3.1

Exemplary Response:

- 15 (cones)

AND

- Distance without end cone $100 - 1\frac{1}{2} = 98\frac{1}{2}$

  $98\frac{1}{2} \div (1\frac{1}{2} + 6) \approx 13.13$
  13.13 + 1 (end cone) = 14.13 or 15 (cones)

  OR

  $100 \div 7\frac{1}{2} \approx 13.3$
  13 (cones) $\times 7\frac{1}{2} = 97.5$ (feet)
  97.5 + 1.5 (distance for end cone) = 99 (feet)
  14 cones not enough—need 1 more cone

  OR

  1200 inches ÷ 90 inches ≈ 13.3
  13 × 90 = 1170 (inches)
  1170 + 18 (distance for end cone) = 1188 (inches)
  1188 < 1200 (inches)
  14 cones not enough—need 1 more cone

  OR

  Other valid process

AND

- $106\frac{1}{2}$ (feet) or 106 feet, 6 inches

  OR

  Correct number of feet based on number of cones indicated

Session: 1
Item: 7
Page: 7
Content Standard(s): 5 Mathematical Systems and Number Theory
Process Standard(s): 3.1

Score Points:

3 points	Exemplary Response (three components)
2 points	Two components OR Correct process; error in computation AND Both answers based on correct process
1 point	One component
0 points	Other

Scoring Comments:

To earn 1 point for correct process, student only needs to show that $100 \div 7\frac{1}{2} \approx 13.3$ or $98\frac{1}{2} \div 7\frac{1}{2} \approx 13.13$ or $1200 \div 90 \approx 13.3$.

28

Item 8
Not Released

Session: 2
Item: 1
Page: 12–13
Content Standard(s): 4 Patterns and Relationships
Process Standard(s): 4.1

Score Points:

4 points — The student's response fully addresses the performance event.

The response:

- demonstrates knowledge of the mathematical concepts and principles needed to complete the event.
- communicates all process components that lead to an appropriate and systematic solution.
- may have only minor flaws with no effect on the reasonableness of the solution.

3 points — The student's response substantially addresses the performance event.

The response:

- demonstrates knowledge of the mathematical concepts and principles needed to complete the event.
- communicates most process components that lead to an appropriate and systematic solution.
- may have only minor flaws with minimal effect on the reasonableness of the solution.

2 points — The student's response partially addresses the performance event.

The response:

- demonstrates a limited knowledge of the mathematical concepts and principles needed to complete the event.
- communicates some process components that lead to an appropriate and systematic solution.
- may have flaws or extraneous information that indicates some lack of understanding or confusion.

30

Session: 2
Item: 1
Page: 12–13
Content Standard(s): 4 Patterns and Relationships
Process Standard(s): 4.1

1 point

The student's response minimally addresses the performance event.

The response:

- demonstrates a limited knowledge of the mathematical concepts and principles needed to complete the event.
- communicates few or no process components that lead to an appropriate and systematic solution.
- may have flaws or extraneous information that indicates lack of understanding or confusion.

0 points

Other—Responses not addressed by the Condition Codes:

Examples of "0":

Work consists of copying the prompt information only.
Work indicates no mathematical understanding of the task.

Session: 2
Item: 1
Page: 12–13
Content Standard(s): 4 Patterns and Relationships
Process Standard(s): 4.1

Sample Solution 1

Length of Phone Call	National Telex	Dial-Direct, Inc.
1	$0.35	$0.21
2	$0.47	$0.35
3	$0.59	$0.49
4	$0.71	$0.63
5	$0.83	$0.77
6	$0.95	$0.91
7	$1.07	$1.05
8	$1.19	$1.19
9	$1.31	$1.33
10	$1.43	$1.47

Recommendation:

Any explanation equivalent to the following, indicating the length of calls when each company is least expensive and when they are equal:

National Telex would have the lower cost when the length of a phone call is greater than 8 minutes. Dial-Direct, Inc. would have the lower cost when the length of a call is less than 8 minutes. If the call is 8 minutes, then the cost of the two companies is equal. Since most of our calls are at least 10 minutes, I would recommend that you choose National Telex.

Session: 2
Item: 1
Page: 12–13
Content Standard(s): 4 Patterns and Relationships
Process Standard(s): 4.1

Sample Solution 2

x = number of minutes after the first minute n = number of minutes

National Telex: $35 + 12x$ = cost (in cents) or $35 + 12(n - 1)$ = cost (in cents)

Dial-Direct, Inc.: $21 + 14x$ = cost (in cents) or $21 + 14(n - 1)$ = cost (in cents)

$35 + 12x = 21 + 14x$
$14 = 2x$
$x = 7$ + first minute = 8 (minutes)

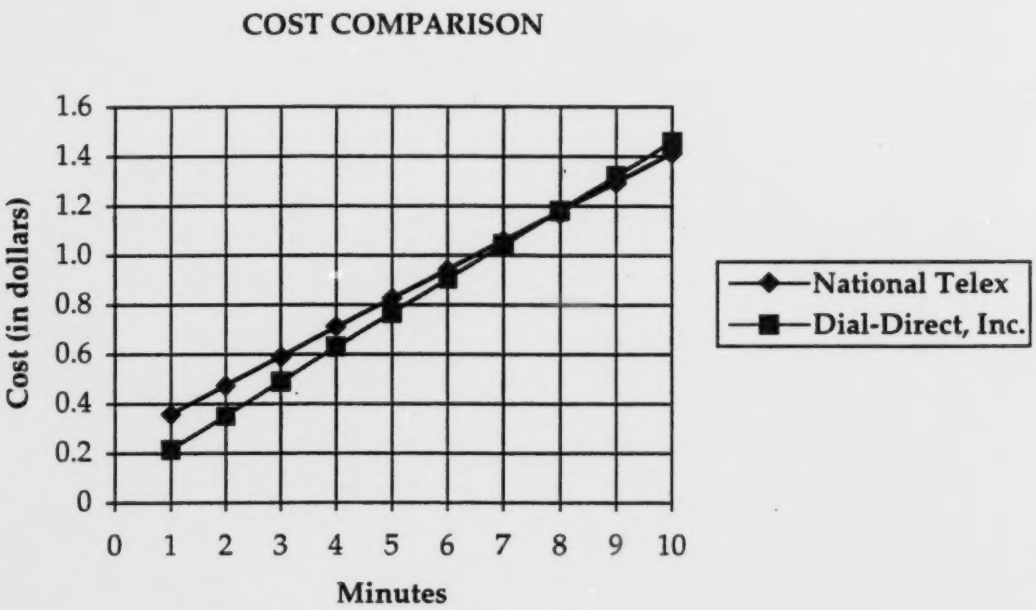
$35 + 12(n - 1) = 21 + 14(n - 1)$
$14 = 2(n - 1) = 2n - 2$
$2n = 16$
$n = 8$ (minutes)

Recommendation:

Same as in Sample Solution 1

Session: 2
Item: 1
Page: 12–13
Content Standard(s): 4 Patterns and Relationships
Process Standard(s): 4.1

Sample Solution 3



Note: Accept any answer that reasonably corresponds with the graph.

Recommendation:

Same as in Sample Solution 1

Item 2-7
Not Released

Session: 2
Item: 8
Page: 20
Content Standard(s): 2 Geometric/Spatial Sense and Measurement
Process Standard(s): 1.10

Exemplary Response:

- 13,188 (miles) if 3.14 is used for π

  OR

  approximately 13,195 (miles) if π is extended

  OR

  4200π (miles)

AND

- $2 \times 3.14 \times 2100$

  OR

  Other valid process

Score Points:

2 points	Exemplary Response
1 point	Correct process; error in computation
	OR
	Correct answer
0 points	Other

Scoring Comments:

Some students extend π from 3.14 to 3.1415927 (probably the π key on their calculator). Answer using extended π is 13,194.69 or 13,195.

Truncating or rounding of answer is allowed.

Session: 2
Item: 9
Page: 21
Content Standard(s): 2 Geometric/Spatial Sense and Measurement
Process Standard(s): 3.7

Exemplary Response:

- 60,000,000 or 60,288,000 (square miles)
  OR
  60,318,579 (square miles) if π is extended
  OR
  19,200,000π (square miles)
  OR
  Equivalent appropriate answer

AND

- $100\% - 70\% = 30\%$
  $0.30(4 \times 3.14 \times 4000^2) =$
  $0.30(200,960,000)$
  OR
  Other valid process

Score Points:

2 points	Exemplary Response
1 point	Correct process; error in computation OR Correct answer
0 points	Other

Scoring Comments:

Truncating or rounding is acceptable when students use the π key (on a calculator).

Session: 2
Item: 10
Page: 21
Content Standard(s): 1 Number Sense
Process Standard(s): 3.7

Exemplary Response:

- 3.72×10^7 or 3.7×10^7 (miles)

AND

- 6 min. 40 sec. = 400 sec.
  $400 \div 2 = 200$ sec.
  $186{,}000 \times 200 = 37{,}200{,}000$

  OR

  Other valid process

Score Points:

3 points	Exemplary Response
2 points	Correct process; error in computation AND Answer correctly expressed in scientific notation OR Correct process AND Correct answer not expressed in scientific notation OR Correct process AND Correct answer not expressed in correct scientific notation

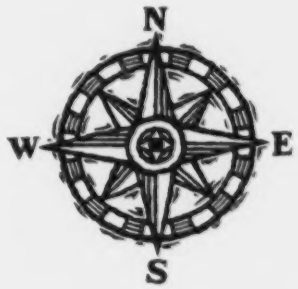
38

Session: 2
Item: 10
Page: 21
Content Standard(s): 1 Number Sense
Process Standard(s): 3.7

1 point	Correct answer expressed in scientific notation OR Correct answer not expressed in scientific notation OR Correct process without arriving at an answer OR Incorrect or no process but final decimal answer correctly expressed in scientific notation
0 points	Other

Scoring Comments:

Many students doing everything correctly EXCEPT dividing by 2 to make distance one way. This is an error in process, not in computation.



Anchor Papers

40

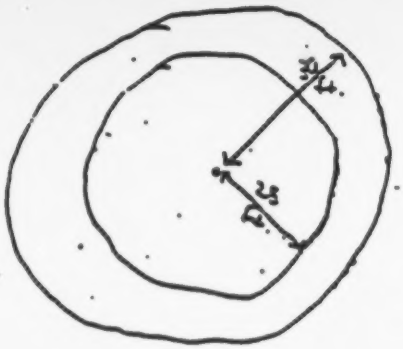
SCORE 2

1

The outer ring of horses on the merry-go-round is 30 feet from the center. The inner ring is 25 feet from the center. If you are on the outer ring and your friend is on the inner ring, what is the difference in distance traveled by you and your friend after the merry-go-round completes 15 revolutions? Provide the work that shows how you arrived at your answer.

$2(3.14)30 =$

$2(3.14)25 =$



$C = 2\pi r$

outer ring = 188.4 ft.

inner ring = 157 ft.

or = 15(188.4) = 2826 ft.

ir = 15(157) = -2355 ft.

471 ft.

Difference is (471) ft.

Correct answer

Correct and complete process
–correctly calculates circumference of inner and outer rings
–multiplies both circumferences by 15 rotations
–subtracts to find difference in distance traveled

Exemplary Response

BEST COPY AVAILABLE

SCORE 1

1

The outer ring of horses on the merry-go-round is 30 feet from the center. The inner ring is 25 feet from the center. If you are on the outer ring and your friend is on the inner ring, what is the difference in distance traveled by you and your friend after the merry-go-round completes 15 revolutions? Provide the work that shows how you arrived at your answer.

3,14 × 60 = 000 + 1884 = 188.40 × 15 = 194200 + 940 = 2826.00

3,14 × 50 = 00.0 + 1570 = 157.00 × 15 = 00000 + 15700 = 1570.00

2826.00 − 1570.00 = 1256.00

Subtracts to find difference in distance traveled

1256.00 ft

Incorrect answer

Error in computation
−157 × 15 = 2355 not 1570

Student correctly finds circumference of inner and outer rings (188.4 and 157)

Correct Process;
Error in Computation

BEST COPY AVAILABLE

SCORE 1

1

The outer ring of horses on the merry-go-round is 30 feet from the center. The inner ring is 25 feet from the center. If you are on the outer ring and your friend is on the inner ring, what is the difference in distance traveled by you and your friend after the merry-go-round completes 15 revolutions? Provide the work that shows how you arrived at your answer.

$C = 2\pi r$ $C = 2\pi(30)$

$C = 188.4 \times 15 = 2826$ ft.

$C = 2\pi(25)$

$157 \times 15 = 2355$ ft

$2826 - 2335 = 491$ ft

Recopying error --subtracts 2335 (instead of 2355) from 2826

Correct process --student finds correct distance of inner and outer rings

491 ft. is the difference in distance.

Incorrect answer

Correct Process; Recopying Error

BEST COPY AVAILABLE

SCORE 0

1

The outer ring of horses on the merry-go-round is 30 feet from the center. The inner ring is 25 feet from the center. If you are on the outer ring and your friend is on the inner ring, what is the difference in distance traveled by you and your friend after the merry-go-round completes 15 revolutions? Provide the work that shows how you arrived at your answer.

30 25
x 15 x 15
150 125
30 25
375
-375
75

The difference is 75 ft

Incorrect answer

Incorrect process –student does not use equation for circumference

BEST COPY AVAILABLE

SESSION 1

SCORE 2

(2)

You are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDE TIMES

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on the average ride time for the first 4 rides, what is the *maximum* number of rides you can go on during the hours you are at the park? Provide the work that shows how you arrived at your answer.

$18 + 24 + 14 + 20 = \frac{76}{4} = 19$ min per ride

10 a.m. to 4 p.m. is 6 hours minus 30 min is 5 hrs + 30 min. = 330 min divided by 19 min is 17.368

answer = 17 rides

Correct answer

Correct and complete process –student shows all components given in the scoring guide

BEST COPY AVAILABLE

Go On

Exemplary Response

Session 1

SCORE 1

[2]

You are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDE TIMES

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on the average ride time for the first 4 rides, what is the *maximum* number of rides you can go on during the hours you are at the park? Provide the work that shows how you arrived at your answer.

Average Time = $\frac{18+24+14+20}{4}$ = 19 min.

(10 AM through 4 P.M.) – 30 min:

6 - 30 = 5 hrs. & 30 min =

5·60 + 30 =

300 + 30 = 330 min

$\frac{330 \text{ min}}{19 \text{ min}}$ = 15 rides

Correct process
–student finds correct average and divides 330 by 19

Incorrect answer
–330 ÷ 19 ≈ 17 not 15

Go On.

BEST COPY AVAILABLE

SCORE 1

2

You are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDE TIMES

Ride	1	2	3	4
Time (minutes)	18	24	14	20

Based on the average ride time for the first 4 rides, what is the ***maximum*** number of rides you can go on during the hours you are at the park? Provide the work that shows how you arrived at your answer.

10 to 4

6 hours

6 hours = 360 min

18
24
14
20
76 min

4⟌76 = 19 min per ride

19⟌360 = 18.95

18 rides

Correct process
–student finds correct average (19 min.) and divides

Incorrect answer
–½ hour lunch time not accounted for in figuring total time
–360 ÷ 19 (instead of 330 ÷ 19)

BEST COPY AVAILABLE

2

SCORE 0

You are going to be at the amusement park from 10 A.M. to 4 P.M. and will spend a half hour eating lunch. The chart below shows how long it took you to go on the first 4 rides. These times include walking to the ride, waiting in line, and riding the ride.

RIDE TIMES

Ride	1	2	3	4
Time (in minutes)	18	24	14	20

Based on the average ride time for the first 4 rides, what is the *maximum* number of rides you can go on during the hours you are at the park? Provide the work that shows how you arrived at your answer.

30
24
14
18
20
106 min

106 x 4

166 x 3 = 498
5

5.3 hrs

76 x 4 = 304

60 | 304
5.06 hrs

76 x 5 = 380

6 hrs

18 rides

Incorrect answer

48

14

Incorrect process
--student does not figure 330 minutes total ride time
--attempts guess and check using 76 minutes and/or 106 minutes

Go On

BEST COPY AVAILABLE

SCORE 2

3

On Fun Fridays, prizes and discounts are given away to the first 300 people who enter the amusement park. Every 6th person who enters the park gets a coupon for a free ride on the Twister, and every 14th person receives a 10% discount on any food they buy that day. Of the first 300 people who enter the park on Fun Friday, how many will receive both a free ride coupon *and* a 10% discount on food? Provide the work that shows how you arrived at your answer.

Correct process
—indicates 42 as the least common multiple
—divides 300 by 42

6 12 18 24 30 36 42
14 28 42

$\frac{300}{42}$ = 7 sets of matche:

7

Correct answer

Exemplary Response

BEST COPY AVAILABLE

3

SCORE 1

On Fun Fridays, prizes and discounts are given away to the first 300 people who enter the amusement park. Every 6th person who enters the park gets a coupon for a free ride on the Twister, and every 14th person receives a 10% discount on any food they buy that day. Of the first 300 people who enter the park on Fun Friday, how many will receive both a free ride coupon *and* a 10% discount on food? Provide the work that shows how you arrived at your answer.

21 r 6
14 | 300

21 10% discants

Incorrect process —divides 14 into 300

7 will recieve both a coupon + a 10% discant

Correct answer

3

On Fun Fridays, prizes and discounts are given away to the first 300 people who enter the amusement park. Every 6th person who enters the park gets a coupon for a free ride on the Twister, and every 14th person receives a 10% discount on any food they buy that day. Of the first 300 people who enter the park on Fun Friday, how many will receive both a free ride coupon *and* a 10% discount on food? Provide the work that shows how you arrived at your answer.

SCORE 0

$6\overline{)300}$ 50 people recieving coupons

$14\overline{)300}$ 21 recieving 10% discount.

50
+21
71 peope reciece both.

Incorrect process – divides 14 and 6 into 300 and adds the quotients

Incorrect answer

BEST COPY AVAILABLE

SCORE 3

4 A parking lot near the amusement park charges \$2.00 for the first hour and \$0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee (F) based on the number of hours (h) you spend at the amusement park.

$F = \$2 + \$1(h-1)$

Correct equation for finding parking fee (F)

Using your equation, how much will you pay the parking attendant for $6\frac{1}{2}$ hours of parking time? Provide the work that shows how you arrived at your answer.

$F = 2 + 1(6.5-1)$

$= 2 + 5.5$

$F = 7.5$

Correct solution for F where h is 6.5

\$7.50

Correct process for calculating F using student's equation

BEST COPY AVAILABLE

SCORE 2

4

A parking lot near the amusement park charges $2.00 for the first hour and $0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee (*F*) based on the number of hours (*h*) you spend at the amusement park.

$F = \$2.00 + \$.50(h-1)$

Incorrect equation
—student does not multiply $0.50 by 2 to get the hourly rate

Using your equation, how much will you pay the parking attendant for $6\frac{1}{2}$ hours of parking time? Provide the work that shows how you arrived at your answer.

$F = \$2.00 + \$.50(6.5-1)$

$\$4.75$

Appropriate solution for F where h is 6.5

Correct process for calculating F based on student's equation
—student's equation is correctly applied

Appropriate Solution Using Incorrect Equation

BEST COPY AVAILABLE

SCORE 1

4

A parking lot near the amusement park charges $2.00 for the first hour and $0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee (*F*) based on the number of hours (*h*) you spend at the amusement park.

3 hours $4.00

2.00
.50
2.50
.50
3.00

3.50
.50
4.00

No equation shown

Using your equation, how much will you pay the parking attendant for $6\frac{1}{2}$ hours of parking time? Provide the work that shows how you arrived at your answer.

2.00
.50
1½ 2.50
.50
2 3.00
.50
2½ 3.50
.50
3 4.00

3.00
.50
3½ 4.50
.50
4 5.00
.50
4.5 5.50
.50
5 6.00
.50
5½ 6.50

5½ 6.50
.50
6 7.00
.50
6½ $7.50

Correct solution for **F** *where* **h** *is 6.5*

No process using equation

One Component

BEST COPY AVAILABLE

149422

SESSION 1

SCORE 1

A parking lot near the amusement park charges $2.00 for the first hour and $0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee (*F*) based on the number of hours (*h*) you spend at the amusement park.

2.00 first hour
$ .50 = additional hour

$F + h = ?$

Incorrect equation for F

Using your equation, how much will you pay the parking attendant for $6\frac{1}{2}$ hours of parking time? Provide the work that shows how you arrived at your answer.

5-1 - 5½ - 4
$2.00 / .50 .50 .50 .50 / .50 .50 .50 .50 .50 .50 / ½ - ½ - ½ - ½ - ½ = ½ / ½ - ½ / ½ - ½ / ½

$7.50

Process does not use equation

Correct solution for F

One Component

BEST COPY AVAILABLE

111573 55

SESSION 1

4

A parking lot near the amusement park charges $2.00 for the first hour and $0.50 for each additional half hour. Write an equation that you could use to calculate the parking fee (*F*) based on the number of hours (*h*) you spend at the amusement park.

SCORE 0

No equation

Using your equation, how much will you pay the parking attendant for $6\frac{1}{2}$ hours of parking time? Provide the work that shows how you arrived at your answer.

1st hr – 2.00
2nd hr – 1.00
3rd hr – 1.00
4th hr – 1.00
5th hr – 1.00
6th hr – 1.00

7.00$ for 6½ hours of parking time

Incorrect solution for **F** *where* **h** *is 6.5*

Incomplete process for calculating **F**
—student finds fee for 6 hours, not 6½ hours

BEST COPY AVAILABLE

SCORE 2

5 Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

RTSC
RSTC
RTCS
RSCT
RCTS
RCST

6 different ways for each per
×4 different people
24 possible combinations

Correct and complete process
--shows 6 possibilities beginning with Ryan
--multiplies 6 possibilities by 4 people

Correct answer

Exemplary Response

BEST COPY AVAILABLE

SCORE 1

5 Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

RTSC
RTCS
RSTC
RSCT
RCST
RCTS

24 different combinations

Correct answer

Incomplete process
—does not show 6 possibilities
× 4 people

BEST COPY AVAILABLE

SCORE 1

5

Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

6 x 4 = 24

Correct answer

6 × 4 is not a sufficient process

BEST COPY AVAILABLE

SCORE 0

5 Ryan, Tracy, Scott, and Chris were discussing the order in which they should use the ramp. If only one person uses the ramp at a time, in how many possible combinations can the 4 friends use the ramp? Provide the work that shows how you arrived at your answer.

R =
T =
S =
C =

R, T, S, C,
T, S, C, R
S, C, T, R
C, T, R, S
R, S, C, T
R, C, T, S
T, R, S, C
T, C, R, S
S, T, R, C
S, R, T, C
C, S, R, T
C, R, S, T

(12)

Incomplete list

Incorrect answer

BEST COPY AVAILABLE

SCORE 2

Directions

Use this table to do Numbers 3 and 4.

RYAN'S PRACTICE RESULTS

Week	Runs
1	1
2	3
3	7
4	13
5	21
6	31
7	43
8	57

Completes table correctly

6

Over the last 6 weeks Ryan has been trying to increase the number of times he can skateboard from the top of one side of the ramp to the top of the other and back without stopping. The table shows his results for the first 6 weeks.

If Ryan continues to improve in Weeks 7 and 8 at the same rate as shown in the table, how many successful runs can he expect each week? Provide the work that shows how you arrived at your answers.

$$\begin{array}{r} 31 \\ +12 \\ \hline 43 \end{array} \qquad \begin{array}{r} 43 \\ +14 \\ \hline 57 \end{array}$$

Indicates correct pattern in table and in work space

Exemplary Response

BEST COPY AVAILABLE

SCORE 1

Directions

Use this table to do Numbers 3 and 4.

RYAN'S PRACTICE RESULTS

Week	Runs
1	1
2	3
3	7
4	13
5	21
6	31
7	43
8	57

Completes table correctly

6

Over the last 6 weeks Ryan has been trying to increase the number of times he can skateboard from the top of one side of the ramp to the top of the other and back without stopping. The table shows his results for the first 6 weeks.

If Ryan continues to improve in Weeks 7 and 8 at the same rate as shown in the table, how many successful runs can he expect each week? Provide the work that shows how you arrived at your answers.

Pattern is not clearly or correctly explained

Went into a pattern 2 every

43, 57

One Component

BEST COPY AVAILABLE

62

SCORE 0

Directions

Use this table to do Numbers 3 and 4.

RYAN'S PRACTICE RESULTS

Week	Runs
1	1
2	3
3	7
4	13
5	21
6	31
7	43
8	58

1.5
2.3
3.2
4.2
5.1
6.1
7.2

5f=21

Pattern is incorrect

Incorrectly completes table —43 is correct, but 58 is not

6

Over the last 6 weeks Ryan has been trying to increase the number of times he can skateboard from the top of one side of the ramp to the top of the other and back without stopping. The table shows his results for the first 6 weeks.

If Ryan continues to improve in Weeks 7 and 8 at the same rate as shown in the table, how many successful runs can he expect each week? Provide the work that shows how you arrived at your answers.

43, 58

BEST COPY AVAILABLE

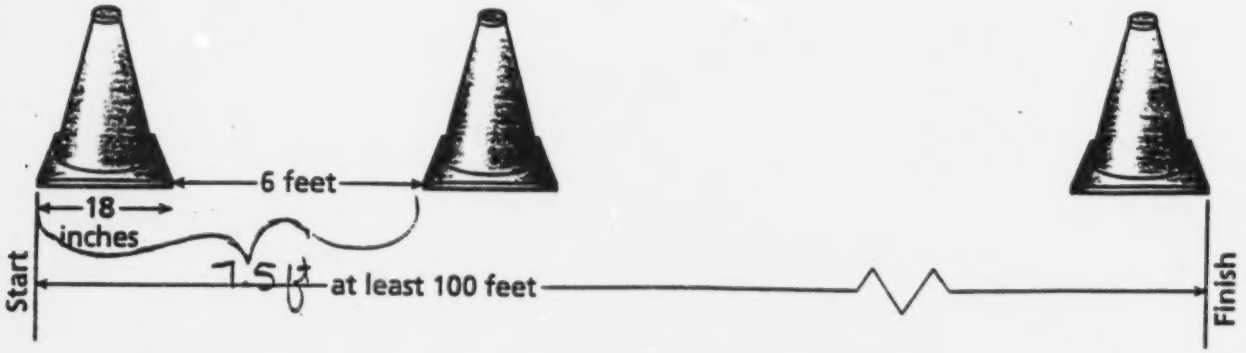
63

Go On

SCORE 3

7

Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.



If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the ***minimum*** number of cones required to make a course that is ***at least*** 100 feet long? Provide the work that shows how you arrived at your answer.

18 inches = 1.5 feet

6 + 1.5 = 7.5

$\frac{100}{7.5} = 13\frac{1}{3}$

14 x 7.5 = 105 + 1.5 = 106.5

cones end cone

15 cones

Correct number of cones

Correct and complete process —divides 100 ft by 7.5 ft, rounds to 14 cones, and adds end cone

Exactly how many feet long will the course be?

14 x 7.5 = 105 + 1.5 = 106.5

106.5 feet

Correct number of feet

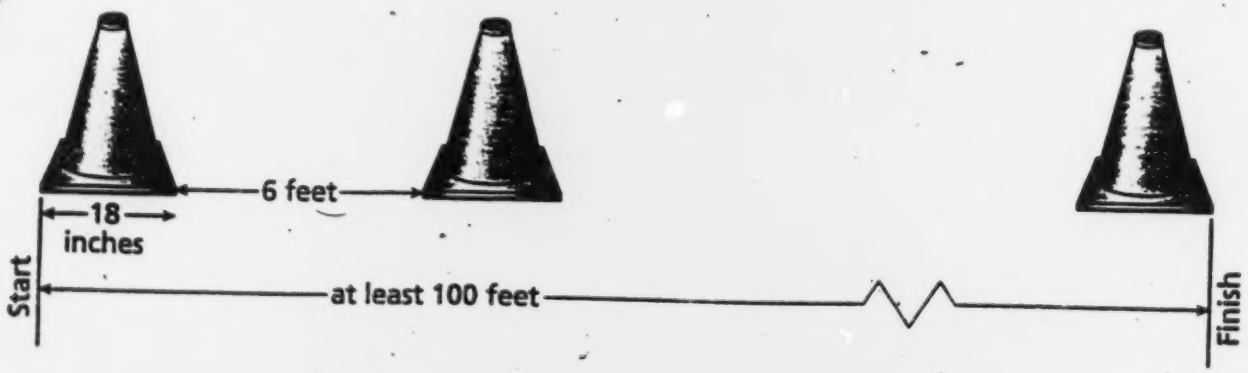
Exemplary Response

BEST COPY AVAILABLE

SCORE 2

7

Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.



If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the ***minimum*** number of cones required to make a course that is ***at least*** 100 feet long? Provide the work that shows how you arrived at your answer.

15 cones

Correct number of cones

No process shown

Exactly how many feet long will the course be?

Not

Correct number of feet

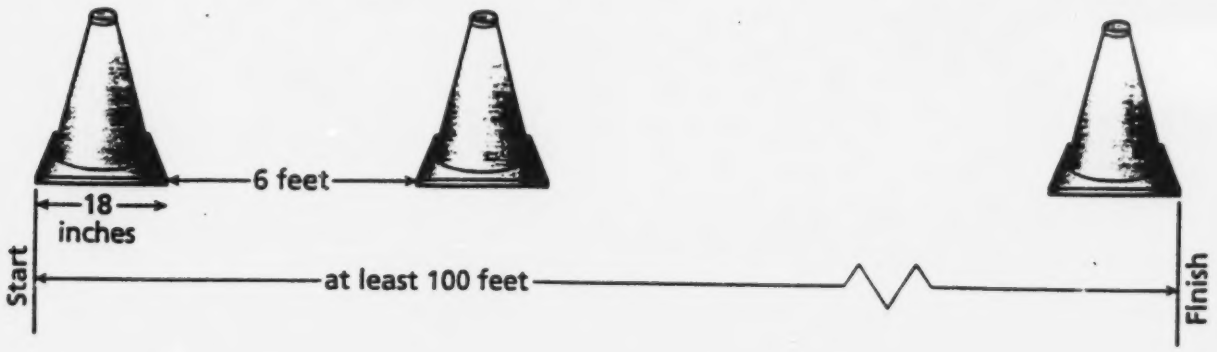
106.5 feet

Two Components

BEST COPY AVAILABLE

SCORE 1

7 Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.



If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the ***minimum*** number of cones required to make a course that is ***at least*** 100 feet long? Provide the work that shows how you arrived at your answer.

18 - 12 = 6
1½ ft
6x + 1½ x = 100
7½x = 100
13⅓

14 cones

Incorrect number of cones

Incomplete, but sufficient, process —equation implies the division process, "100 ÷ 7½"

Exactly how many feet long will the course be?

14(1½) 6(14
21 + 84

105 ft

Incorrect number of feet

BEST COPY AVAILABLE

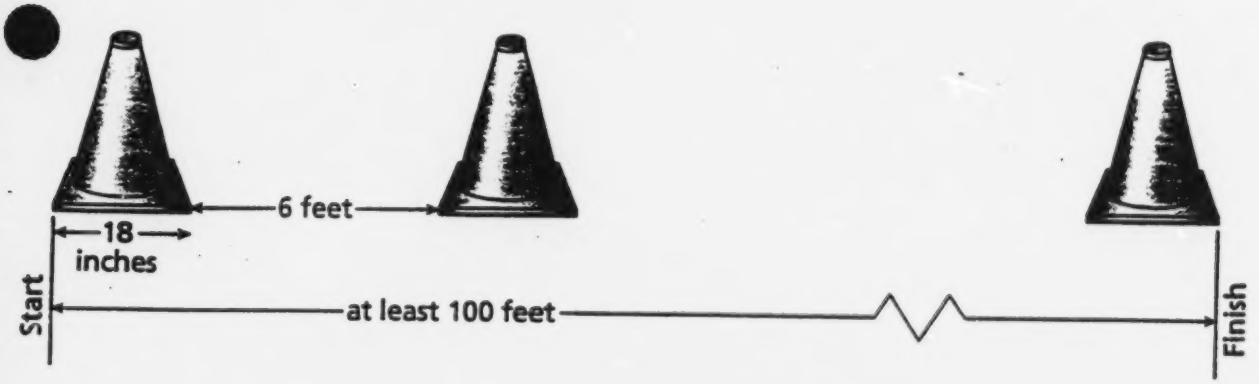
One Component

110219 66

Go On

SESSION 1

7 Leon and Jackie are setting up a course so the skateboarders can practice their turns. They use traffic cones evenly spaced on a sloped ramp for the course.



If the base of each cone is 18 inches wide and the cones are spaced exactly 6 feet apart, what is the ***minimum*** number of cones required to make a course that is ***at least*** 100 feet long? Provide the work that shows how you arrived at your answer.

18"

16 r4
6|100
6
40
36
4

3
16
x 6
96

Incorrect process —divides 100 feet by 6 rather than by 7.5 ft.

26 Cones

Incorrect number of cones

1.5 6 1.5 6 1.5 6 1.5 6 1.5

2
31.5
5
87.5

25

8 · 5 6 1.5 8

Exactly how many feet long will the course be?

95 feet

Incorrect number of feet

BEST COPY AVAILABLE

Item 8
Not Released

Telephone Rates

SCORE 4

Directions

Show all of your work and write your answers directly in this booklet.

1 John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

John contacted several telephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

TELEPHONE COMPANY RATES

	National Telex		Dial-Direct, Inc.	
	First minute	Each additional minute	First minute	Each additional minute
Daytime	$0.46	$0.18	$0.30	$0.20
Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	$0.35	$0.12	30% off daytime	30% off daytime

NT = 0.35 + 0.12(n-1)

DD = 0.7(0.30 + 0.20(n))

Indicates two correct equations for finding cost

BEST COPY AVAILABLE

1

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

cost/min

	National Telex	Dial-Direct
one min	$0.35	$0.21
	$0.47	$0.35
	$0.59	$0.49
	$0.71	$0.63
	$0.83	$0.77
	$0.95	$0.91
	$1.07	$1.05
eight min	$1.19	$1.19
	$1.31	$1.33
	$1.43	$1.47
	$1.55	$1.61
	$1.67	$1.75
	$1.79	$1.89
14 min	$1.91	$2.03

Includes a table correctly comparing the rates –10 minute cost comparison is correct –indicates same cost ($1.19) at 8 minutes

Writes a correct recommendation

Because the family speaks an average of 10 min on the phone (long distance), I would recommend that they use National Telex. Although it is more expensive on shorter calls, in 8 minutes, National Telex becomes less expensive. It suits this family's needs. STOP

The response fully addresses the performance event –Effectively communicates all process components (with no flaws)

BEST COPY AVAILABLE

Telephone Rates

SCORE 3

Directions

Show all of your work and write your answers directly in this booklet.

1

John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

John contacted several telephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

TELEPHONE COMPANY RATES

	National Telex		Dial-Direct, Inc.	
	First minute	Each additional minute	First minute	Each additional minute
Daytime	$0.46	$0.18	$0.30	$0.20
Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	$0.35	$0.12	30% off daytime	30% off daytime

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., ***and*** when each company would charge the same amount.

BEST COPY AVAILABLE

SESSION 2 71

SCORE 3

1 John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

Correctly solves for 10 minute costs using appropriate equations

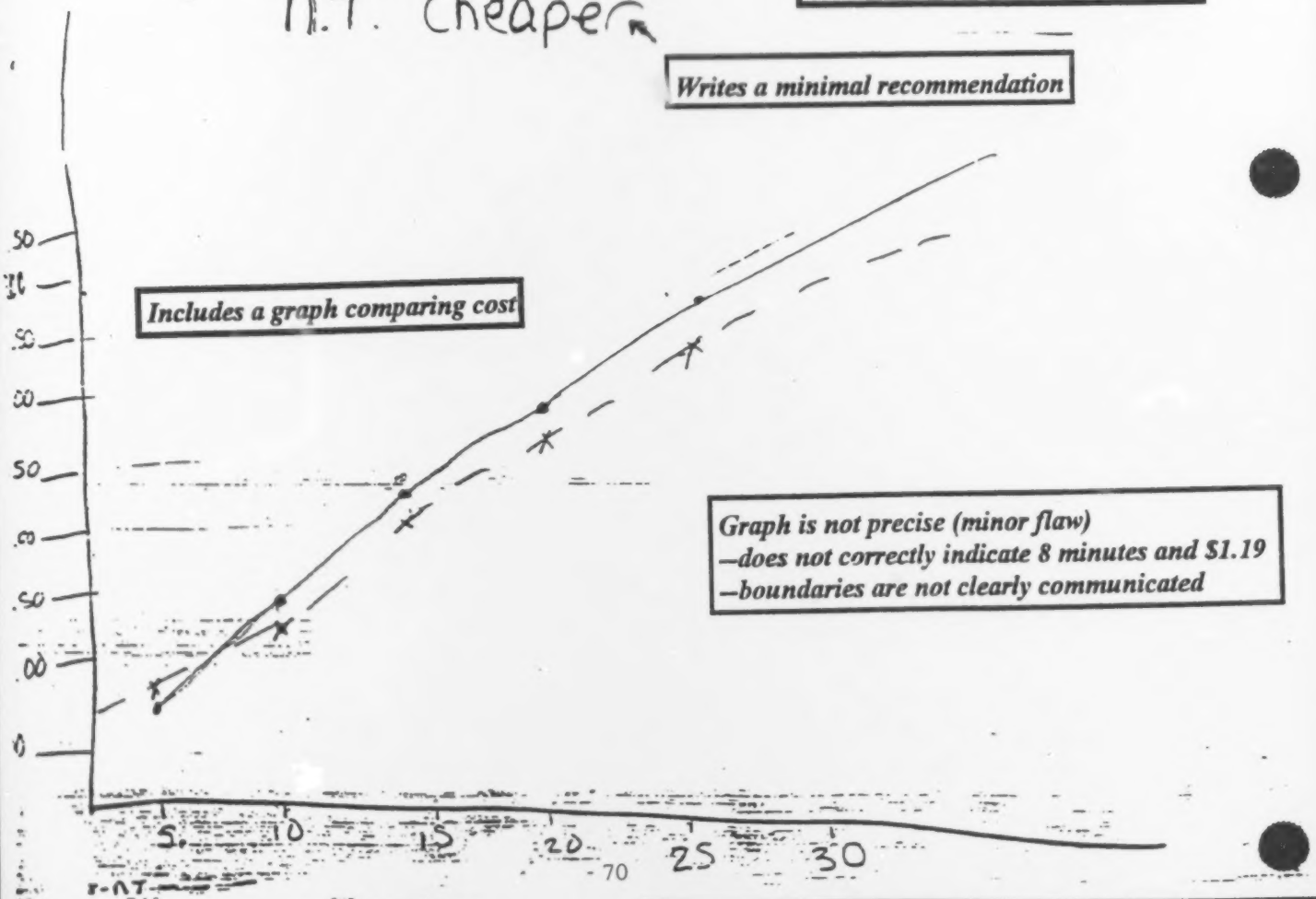
N.T.
10 x .12 = 1.20
.35+
1.55

D.D.
9 x .14 = 1.26
.21 + 1.26
= 1.47

7 min- same amount
N.T. cheaper

States that at 7 minutes the charge would be the same (minor flaw)

Writes a minimal recommendation



Includes a graph comparing cost

Graph is not precise (minor flaw)
–does not correctly indicate 8 minutes and $1.19
–boundaries are not clearly communicated

The response substantially addresses the performance ever.
–Communicates most process components
–Contains minor flaws

BEST COPY AVAILABLE

Telephone Rates

SCORE 2

Directions

Show all of your work and write your answers directly in this booklet.

1

John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

John contacted several telephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

TELEPHONE COMPANY RATES

	National Telex		Dial-Direct, Inc.	
	First minute	Each additional minute	First minute	Each additional minute
Daytime	$0.46	$0.18	$0.30	$0.20
Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	$0.35	$0.12	30% off daytime	30% off daytime

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

Session 23

184937

BEST COPY AVAILABLE

SCORE 2

1 John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

P = price x = number of minutes

National Telex

$0.35 + (0.12)x = P$

Includes a table and equations

1 minute	2	3	4	5	6	7	8	9	10	11	12	13	14
0.35	.47	.59	.71	.83	.95	1.07	1.19	1.31	1.43	1.55	1.67	1.79	1.91

Dial-Direct

$0.21 + (.14)x = P$

Correctly solves for 10 minute costs

1 minute	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0.21	0.35	0.49	0.63	0.91		1.19		1.47		1.75	1.89	2.03	2.17	

0.77 1.05 1.33 1.61

Correctly states when costs are equal

at eight minutes the price is the same

The response partially addresses the performance event --Communicates some process components

The response does not include a clear indication of company choice

BEST COPY AVAILABLE

74

STOP

Telephone Rates

SCORE 2

Directions

Show all of your work and write your answers directly in this booklet.

1

John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

John contacted several telephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

TELEPHONE COMPANY RATES

	National Telex		Dial-Direct, Inc.	
	First minute	Each additional minute	First minute	Each additional minute
Daytime	$0.46	$0.18	$0.30	$0.20
Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	$0.35	$0.12	30% off daytime	30% off daytime

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

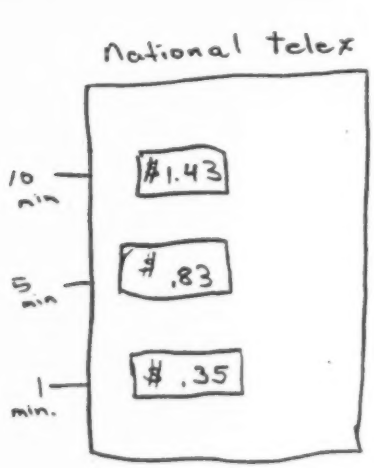
Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

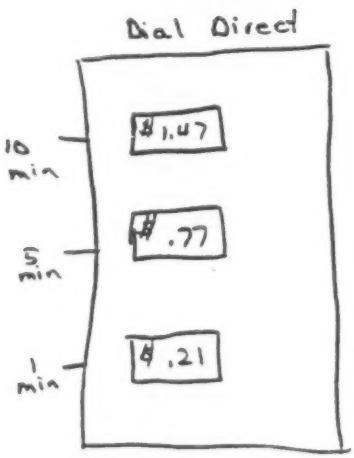
Session 2 75
122914

BEST COPY AVAILABLE

1 John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., ***and*** when each company would charge the same amount.





Includes a comparison of cost below ten minutes

1 min = $.35

5 min = $.12 x 5 + $.35

10 min = $.12 x 9 + $.35

1 min = $.30 - .30x.30

5 min = .56 + .21

10 min = 1.26 + .21

Correctly solves for ten minute costs using appropriate equations

The response does not include
—Solution indicating that 8 minutes is when each company charges the same amount
—Recommendation of National Telex

The response partially addresses the performance event
—Communicates some process components

76

STC

122916

SESSION 2

Telephone Rates

SCORE 1

Directions

Show all of your work and write your answers directly in this booklet.

1 John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

John contacted several telephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

TELEPHONE COMPANY RATES

	National Telex		Dial-Direct, Inc.	
	First minute	Each additional minute	First minute	Each additional minute
Daytime	$0.46	$0.18	$0.30	$0.20
Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	$0.35	$0.12	30% off daytime	30% off daytime

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

BEST COPY AVAILABLE

SCORE 1

1

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

.30 - .30
.30 - .09
.20 : .06

.35 + (.12 · 9)

.35 + 1.08

= 1.43 10 min Natl

.21 + (.14 · 9)

= 1.47 10 min. Dial Direct

Correctly solves for ten minute costs using appropriate equations

The response does not include
–Comparison of cost before 8 (or 10) minutes
–Solution indicating that 8 minutes is when each company charges the same amount
–Recommendation of National Telex

The response minimally addresses the performance event
–Communicates few process components

BEST COPY AVAILABLE

Telephone Rates

SCORE 1

Directions

Show all of your work and write your answers directly in this booklet.

1 John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

John contacted several telephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

TELEPHONE COMPANY RATES

	National Telex		Dial-Direct, Inc.	
	First minute	Each additional minute	First minute	Each additional minute
Daytime	$0.46	$0.18	$0.30	$0.20
Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	$0.35	$0.12	30% off daytime	30% off daytime

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

BEST COPY AVAILABLE

SCORE 1

1

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

The response minimally addresses the performance event
--Communicates few process components

The response does not include
--Appropriate equations for finding the cost of phone calls
--Comparison of cost before 8 (or 10) minutes
--Solution indicating that 8 minutes is when each company charges the same amount

Nat'l telex

1.43 weekend (10 MIN.)

(first .35¢ add. 12¢)

Student gives correct 10 minute cost for National Telex

Dial-Direct. INC

~~21.40~~ weekend (10 MIN)

(first 20¢ add. 13.4¢)

Dial-Direct.INC

Writes appropriate recommendation based on calculations

The response indicates lack of understanding
-Incorrectly calculates 10 minute cost at Dial-Direct
--states "20 + 13.4 " rather than 21 + 14

80

Telephone Rates

SCORE 0

Directions

Show all of your work and write your answers directly in this booklet.

1 John and his family recently moved. His family asked him to help recommend a telephone company that offers the least expensive long-distance rates.

John contacted several telephone companies and has narrowed the choice to National Telex and Dial-Direct, Inc. The rates for the two companies are shown below.

TELEPHONE COMPANY RATES

	National Telex		Dial-Direct, Inc.	
	First minute	Each additional minute	First minute	Each additional minute
Daytime	$0.46	$0.18	$0.30	$0.20
Evening	$0.40	$0.15	20% off daytime	20% off daytime
Weekend	$0.35	$0.12	30% off daytime	30% off daytime

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

BEST COPY AVAILABLE

SCORE 0

1

John's family makes most of their long-distance calls on the weekends, and each call averages 10 minutes.

Use the weekend rates shown in the table to write a recommendation that John would present to his family to choose a particular company. Your recommendation should include a graph, table, or equations showing what length of phone call would cost the least at National Telex, the least at Dial-Direct, Inc., *and* when each company would charge the same amount.

	National Telex		Dial-Direct, Inc.	
	First min.	add min.	first min	add min
daytime	4.60	1.80	3.00	2.00
evening	4.40	1.50	2.40	1.40
weekend	3.50	1.20	2.30	1.30

$17.00

$12.40

Incorrectly calculates rates —multiplies 10 minutes by .46

Table indicates no understanding of calculating cost of phone calls
—4.60 + 4.40 + 3.50 + 1.80 + 1.50 + 1.20 = 17.00
—3.00 + 2.40 + 2.30 + 2.00 + 1.40 + 1.30 = 12.40

20% x 3.00 = .60

30% x 3.00 = .90

3.00
- .90
2.30

3.00
- .60
2.40

Dial

Does not indicate when the costs would be the same

82

Work indicates no mathematical understanding of the task

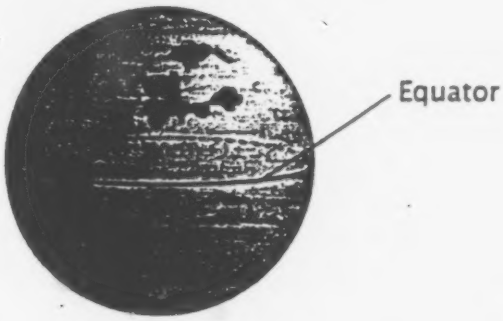
SESSION 2

Item 2-7
Not Released

SCORE 2

8

The equator of a planet is defined as its circumference drawn perpendicular to its axis of rotation.



If the radius of Mars is 2100 miles, what is the length of its equator? Provide the work that shows how you arrived at your answer.

$C = 2\pi r$

$C = 2 \times 3.14 \times 2100$

$C = 13188$

13188 miles

Correct answer

Correct process - $2\pi r$

Exemplary Response

SCORE 1

8

The equator of a planet is defined as its circumference drawn perpendicular to its axis of rotation.

If the radius of Mars is 2100 miles, what is the length of its equator? Provide the work that shows how you arrived at your answer.

~~3298.6 12780 miles~~

13194.68915 miles

Correct answer with π extended to 3.141592654

No process shown

BEST COPY AVAILABLE

SCORE 0

8

The equator of a planet is defined as its circumference drawn perpendicular to its axis of rotation.

If the radius of Mars is 2100 miles, what is the length of its equator? Provide the work that shows how you arrived at your answer.

$D = r^2$

$r = 2100 + 2100$

$D = 4200$ equator

Incorrect process
–writes r^2 and computes $2r$

Incorrect answer

SCORE 2

9

About 70% of Earth's surface is covered with water. If the radius of Earth is approximately 4000 miles, approximately how many square miles of its surface are landmasses? Provide the work that shows how you arrived at your answer.

(Surface Area = $4\pi r^2$)

4π 16,000,000

(12.56)(16,000,000

2,009,600,008 x 0.3 =

602,880,000 square miles are landmasses.

Correct and complete process –student shows $4\pi r^2$ multiplied by 30%

Correct answer

Exemplary Response

BEST COPY AVAILABLE

SCORE 1

9

About 70% of Earth's surface is covered with water. If the radius of Earth is approximately 4000 miles, approximately how many square miles of its surface are landmasses? Provide the work that shows how you arrived at your answer.

(Surface Area = $4\pi r^2$)

$4\pi 4000^2$

$602\cancel{8}8000$

Incomplete process

—4π 4000 ^{2} is not sufficient for the process component

Correct answer

88

BEST COPY AVAILABLE

Go On

SCORE 0

9

About 70% of Earth's surface is covered with water. If the radius of Earth is approximately 4000 miles, approximately how many square miles of its surface are landmasses? Provide the work that shows how you arrived at your answer.

(Surface Area = $4\pi r^2$)

201,061,929.8

Incorrect answer

No process shown

89

- Go C

SCORE 3

10

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

3 min 20sec

200 sec

Shows one half of 6 minutes 40 seconds and converts to 200 seconds

186000
× 200
37200000 ≈ 3.72 X10⁷ mi.

Correctly calculates 186,000 miles × 200 seconds

Correct answer expressed in scientific notation

BEST COPY AVAILABLE

Exemplary Response

SCORE 2

10

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

Correct and complete process
—converts 6 minutes 40 seconds to 400 seconds
—correctly calculates miles

$(6 \times 60) + 40 = 400$ seconds

$186{,}000 \times \left[\frac{1}{2}(400)\right] = d$

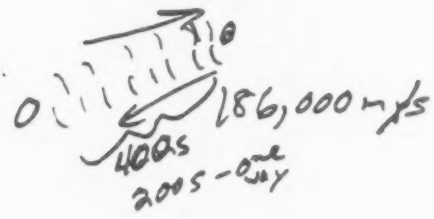
37,200,000 miles

Correct answer not expressed in scientific notation

SCORE 2

10

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.



$\bar{V} = 186{,}000$ mi/s
$t = 200$ s
$d = ?$

$\bar{V} = d/t$
$186{,}000 = d/200$
$d = 37200000$

39,200,000 mi

3.92×10^7

Correct & complete process –student correctly uses 200 seconds and multiplies 200 × 186,000

Error in computation –computes 39,200,000 miles rather than 37,200,000 miles

Student's answer correctly expressed in scientific notation

SCORE 2

10

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

6 x 60 + 360 + 40 = 400 sec

186,000
x 400
74,400,000

37,200,000

37,200,000
2 | 74,400,000
-6
14
-14
04
0

37.2 x 10^6

Correct & complete process

Correct answer

Answer expressed in incorrect scientific notation

BEST COPY AVAILABLE

SCORE 1

10

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

$\frac{186000\ m}{1\ s} = \frac{6\ m}{40\ s}$ $\quad 6m \cdot \frac{60s}{1}$

$360s + 40s = 400s$

$\frac{186000}{1\ s} = \frac{x}{400\ s}$

Incorrect process multiplies 400 seconds × 186,000 miles

$= 74400000$

7.44×10^7

Incorrect answer

Answer correctly expressed in scientific notation

SCORE 1

10

Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

37200000 miles

Correct answer

No process shown

Answer not expressed in scientific notation

SCORE 0

10 Astronomers sent a signal to a space probe on the surface of Venus. The signal traveled at a speed of 186,000 miles per second and took 6 minutes 40 seconds to reach the probe and return to Earth. What was the approximate distance (expressed in scientific notation) between Earth and Venus at the time the signal was sent? Provide the work that shows how you arrived at your answer.

186,000 miles per sec.
6 minutes
40 sec
186,000 x 6 x 40

Incorrect process

No correct answer
No answer expressed in scientific notation

BEST COPY AVAILABLE